

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

see form PCT/ISA/220

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/GB2005/001081

International filing date (day/month/year)
22.03.2005

Priority date (day/month/year)
02.04.2004

International Patent Classification (IPC) or both national classification and IPC
G02B26/02, G09F9/37

Applicant
EASTMAN KODAK COMPANY

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

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WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

10/586063

International application No.
PCT/GB2005/001081

AP20 Rec'd PCT/PTO 14 JUL 2006

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ in written format
 - ☐ in computer readable form
 - c. time of filing/furnishing:
 - ☐ contained in the international application as filed.
 - ☐ filed together with the international application in computer readable form.
 - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

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Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-19
	No: Claims	
Inventive step (IS)	Yes: Claims	1-19
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-19
	No: Claims	

2. Citations and explanations

see separate sheet

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Section V

Reference is made to the following documents:

- D1: EP-A-1 400 834 (HEWLETT-PACKARD DEVELOPMENT COMPANY, L.P) 24 March 2004 (2004-03-24)
- D2: US 4 419 663 A (KOHASHI ET AL) 6 December 1983 (1983-12-06)
- D3: US-A-4 488 785 (KOHASHI ET AL) 18 December 1984 (1984-12-18)
- D4: US-A-4 569 575 (LE PESANT ET AL) 11 February 1986 (1986-02-11)
- D5: EP 0 884 714 A (XEROX CORPORATION) 16 December 1998 (1998-12-16)

- 2.1) Document D1, which is considered to represent the most relevant state of the art, discloses in figures 3 and 4 (the references in parentheses applying to this document):

A display element comprising a liquid 50, a first capillary area enclosed by a first conductive electrode 64 covered by a lyophobic material 63, a second capillary area enclosed by a second electrode 60, also covered by the lyophobic material 63, and means 66 for selectively connecting a voltage across the capillary areas, such that on sequential application of a voltage to each conductive area the liquid is displaced from one location to another, the liquid only returning to the original location upon alternate sequential application of the voltage.

From this, the subject-matter of independent claim 1 differs at least in that the capillary areas, the electrodes and the lyophobic coating are replaced each by a porous layer made of conductive particles covered with a lyophobic and electrically insulating coating.

- 2.2) The subject-matter of claim 1 is therefore novel (Article 33(2) PCT).

The problem to be solved by the present invention may be regarded as providing an alternative confining material for an electrowetting display.

The solution to this problem proposed in claim 1 of the present application is

considered as involving an inventive step (Article 33(3) PCT) since none of the documents appears to suggest the feature of a porous electrode material made of conductive particles covered by a lyophobic coating:

Porous layers for electrowetting displays are known from D2, disclosing in figure 1 and 4 a display element comprising a single layer of porous material 111, a discrete drop of liquid 160,112, and means 122 for connecting a voltage V_b to the layer, whereby on application of a voltage between the liquid and the porous layer, the drop of moves out of the layer, the drop moving back into the layer on removal of the voltage (col. 6 lines 65 to col.7 line 14), the movement of the liquid effecting an optical change when viewed from above the porous layer (figure 4).

Claim 1 also differs from D2 in that the porous layer is made of conductive particles covered with a lyophobic and electrically insulating coating. At best, this document would suggest with D1 to use a lyophobic porous material but to place the electrode on the outside.

Capillary conductive structures having a liquid absorbing function by electrowetting are also disclosed in D3, figure 1, where a mesh of wires 400 (col. 3 lines 3-21) is disclosed as electrode. The electrodes 31,32 are here used as a controllable barrier between the first capillary member 400 and a second porous member 10. With zero volt applied to the mesh the system is in an intermediate stage (figure 2a), negative or positive variation of the voltage controlling the flow direction. A small amount of lyophobic material 600 is used on the upper side of the mesh. However this is no continuous coating and it solves another problem (col. 4 lines 58-66).

D4 discloses (figures 1-3) a display apparatus comprising a pair of plates 1 and 2 having a lyophobic coating 3,4 (col. 3 lines 26 -33) confining a droplet 13, and a plurality of selectively controllable electrodes 19-23 for moving the droplet by electrowetting forces. The remarks of D1 also apply to D4.

D5, in figure 12, discloses, electrodes 88,90 coated with a hydrophobic material 94,96 which draw a drop of liquid I3 in the interelectrode space upon application of a voltage. This document, similar to D1, does not make use of a porous material made

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of particles.

- 2.3) Claims 2-19 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.